

AMENDMENTS TO THE DRAWINGS

The attached sheet of drawings includes changes to Fig. 1. Specifically, reference numerals 5, 6 and 7 were added. The entry of the amended drawing is respectfully requested.

Attachment: Replacement Sheet  
Annotated Sheet Showing Changes

REMARKS

Reconsideration of the subject application is respectfully requested.

Claims 1, 3-4, 6, 7, 9, and 10 remain pending in the subject application. Claims 6 and 7 have been amended herein. Claims 2, 5, and 8 have been previously canceled to facilitate prosecution of the instant application.

Item # 3 of the current Office Action has objected to claims 6 and 7 because the of claim language reciting "component surfaces." The Office Action has requested the language be amended to recite "surfaces of the components." Amendments to claims 6 and 7 have been made. Applicant respectfully requests withdrawal of this objection.

Item #4 of the current Office Action has objected to the Drawings under 37 CFR § 1.83(a) as failing to show each and every feature of the claimed invention. Applicant submits herewith Replacement Drawing Sheet for Figure 1. Applicant has amended the specification to recite elements set forth in the New Drawing Sheet and has included element 5, a primary system (disclosed, at least, in the specification as filed, at least on page 1, lines 16-22 and page 5, lines 16-22); element 6, a feed water system (disclosed, at least, in the specification as filed, on page 7, lines 24-26); and 7, surfaces of the components (disclosed, at least, in the specification as filed, on page 6, lines 9-10). These elements are disclosed in the specification as noted and due not constitute new matter. Applicant respectfully asserts Replacement Drawing Sheet satisfies the requirements of 37 CFR 1.83(a) and respectfully requests withdrawal of this objection.

Claims 1, 3, 4, and 6-9 are rejected under 35 U.S.C. §103(a) over U.S. Patent No. 5,181,893 (referred to herein as the '893 Patent) in view of U.S. Patent Application Publication No. 2001/0004962 (referred to herein as the '962 publication).

Applicant respectfully traverses this rejection based on the representations set forth below.

Applicant asserts that when examining the cited references, as a whole, the subject invention cannot be deemed obvious for reasons to be set forth below.

The invention of the '893 patent, as a whole, is explicitly described in columns 1 to 3. The disclosure provides that oxidizing species (for example  $H_2O_2$ ,  $O_2$ ) contained in the reactor water are formed by radiolysis from water molecules (see column 2, lines 4-13) and increase the intergranular stress corrosion (IGSCC). In order to protect the components against stress corrosion, the so-called hydrogen water chemistry (HWC) is used, which means, hydrogen is continuously added during the reactor operation, which hydrogen forms a compound with the mentioned species thereby neutralizing the latter (see column 2, lines 13-24). In order to guarantee this, high hydrogen concentrations are required, which, however, are disadvantageous (they increase the radiation dose rate in the main stream of the reactor).

It is therefore an aim to utilize the advantages of HWC at low hydrogen concentrations (see column 2, lines 58 to column 3, line 9). This is customarily achieved by a catalytic acceleration of the reaction between hydrogen and the mentioned oxidizing species, specifically by applying Pd or a metal from the group of palladium onto the surfaces of the reactor. In the '893 patent, small amounts already suffice and the catalytically effective material, here Pd, is thus not used during the catalysis (see column 3, lines 10-66).

The method of the '893 patent provides a method of applying Pd onto the surface of reactor components. The Pd is suggested, wherein a metal-containing compound is added that decomposes, thereby releasing metal atoms, which deposit onto the component surfaces (see column 4, lines 31-44). This is a short-term measure aimed solely at depositing catalytically effective metals onto component surfaces (a metal from the group of Pt). Once the component surfaces have been doped with the metal, the catalytic effect is there, which means, the acceleration of the reaction between the oxidizing species (for example oxygen), which are formed (develop) during the operation of the reactor, and a reducing agent (for example hydrogen). The concentration of the oxidizing species during the operation of the reactor is thereby decreased and the corrosion resistance of the component surfaces is thus increased. The purpose of the method in the '893 patent is not to continuously maintain a predetermined concentration of catalytically effective metal in the reactor water from 1ppb to 1000 ppb during the operation of the reactor. The concentration should merely guarantee that a sufficient amount of metal is deposited onto the component surfaces. As soon as that has been achieved, the measure has fulfilled its purpose.

In summary, it follows that the method described in the '893 patent, as a whole, is solely a measure taken on a short-term basis in a reactor in operation in order to deposit a metal onto the component surfaces. One can also acquire from Fig. 2 that this is so. It can clearly be seen that, after the end of the Pd injection, the electrochemical corrosion potential (ECP) does not increase again, but on the contrary, even slightly decreases. Applicant would also like to respectfully point to Figs. 3 and 4, which clearly show that the ECP does not depend upon the concentration of Pd in the reactor water but from the ratio of the concentration of O<sub>2</sub> and H<sub>2</sub> in the reactor water. The opinion in the Office Action, that the known method makes provision of continuously maintaining a certain concentration

of Pd in the reactor water is therefore not correct . The latter should only be given during the short-term doping of the surface components.

It results from all of this that even the addition of a Pd-containing compound for the purpose of Pd doping of the surface components together with an ethanol-containing compound in accordance with the teaching of the '893 patent, does not render obvious the method in accordance with the invention. An alcohol that is solely present during the doping of the surface components cannot protect the components of the primary system of a boiling water reactor against corrosion since that requires the continuous feeding of alcohol. Thus, the teaching of the '893 patent actually teaches away from the method of the subject invention.

Applicant respectfully asserts the cited '893 reference not only fails to render the subject claims obvious, but the '893 patent teaches away from the subject claims. Applicant asserts the prior art as a whole must be examined. Additionally, in order to use a reference as prior art, the MPEP 2141.02 and applicable case law provide "A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention." *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983).

In addition, the cited '893 patent requires significantly higher alcohol concentrations than those calculated by the Office Action are present in the known method.

The Office Action incorrectly purports that the ratio of the number of mole of Pd or Pd-acetylacetonat to the number of mole of ethanol in the injection solution (column 9, lines 55 et seq.) does not change, if the injection solution is introduced into the reactor, thus being

diluted. This assessment, however, is only correct if the concentration of Pd, under the conditions present in the reactor, changes to the same extent than the concentration of ethanol, which, however, could hardly be the case. Thus, Pd permanently deposits on the component surfaces (it is added for this purpose), which is not the case with alcohol. Even assuming a fixed ratio of Pd to ethanol, **the calculation in the Office Action is incorrect.**

When calculating the mole ratio of Pd to ethanol, the Office Action correctly assumes that the number of moles of a substance results from its mass divided by its atomic weight (in the case of a single element such as Pd) or its molecular weight (in the case of molecules).

Thus, the case of Pd-acetylacetonat:  $52.6 \times 10^{-3} \text{g} / 304.4 \text{g/mol}$ , the value of which is  $0.000173 = 0.173 \text{ mmol}$  (Millimol). 52.6g Pd-acetylacetonat thus correspond to 0.173 mmol. The Office Action performed this calculation correctly.

In the case of ethanol, its mass must be calculated first. If one assumes the specific weight (or more correctly the density) is 0.79 times the density of water, the following calculation results: 1ml water = 1g. 1ml ethanol = 0.79g. 50ml ethanol thus have a mass of 39.5g and not  $39.5 \times 10^{-3} \text{g}$  (= 39.5mg). Here, the Office Action makes a first mistake.

Accordingly, the calculation in the Office Action of the mole number of ethanol ( $39.5 \times 10^{-3} \text{g} / 46 \text{g/mol}$  ethanol) leads to the wrong value  $0.86 \times 10^{-3} \text{ mol} = 0.86 \text{ mmol}$ . The correct value, however, is 1000 times greater, namely 0.86 mol or 860 mmol.

The Pd-ethanol mole ratio is thus  $0.173 \text{ mmol Pd} / 860 \text{ mmol ethanol} = 0.0002$  (and not 0.2 as set forth in the Office Action!). This means that the molar concentration of ethanol is greater than the molar concentration of Pd by the factor of 5000 (not 5).

The Office Action then makes a further calculation mistake by multiplying the concentration of Pd based on ppm in the reactor water with the mentioned factor. Thus, a concentration of 1ppb of Pd, for example, is supposed to correspond to a concentration of 5 ppb of ethanol, which is incorrect. The entity ppb means that a substance is present in a total amount of 1kg with a mass portion of 1 $\mu$ g (= 10<sup>-9</sup>kg). Accordingly, the concentration indication of 1ppb Pd means that 1kg reactor water contains 1 $\mu$ g palladium. Prior to applying the factor in question, one must convert the unit ppm into the unit mol/kg.

1ppb Pd = 1 $\mu$ g/kg / atomic weight Pd = 1x10<sup>-6</sup>g/kg / 106.4g/mol = 0.0094 x 10<sup>-6</sup> mol/kg = 9.4 x 10<sup>-9</sup> mol/kg = 9.4 x 10<sup>-3</sup>  $\mu$ mol/kg. This value must now be multiplied by 5000:

9.4 x 10<sup>-3</sup>  $\mu$ mol/kg x 5000 = 47  $\mu$ mol/kg.

1ppb Pd thus corresponds to 47  $\mu$ mol/kg.

1000 ppb Pd then corresponds to 47000  $\mu$ mol/kg.

The following concentration ranges thus result for ethanol.

'893 Patent	47 to 47000 $\mu$ mol/kg
Subject invention	0.1 to less than 10 $\mu$ mol/kg

Thus, **with the correct calculation**, there is no overlap of ranges from the '893 patent to the range claimed in the subject application!

Because the method taught in the '893 patent teaches that significantly more concentration is required to achieve the desired result, the only way such a teaching may exist is through the impermissible use of hindsight reconstruction.

Irrespective of the Office Action's reliance on hindsight reconstruction, the cited reference still does not teach or suggest, or otherwise make obvious, the subject invention, as claimed. Recently, the USPTO published its "Examination Guidelines for Determining Obviousness Under 35 USC 103 In View of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.*" See, FR Vol. 72, No. 195, pp. 57527-57335, Oct. 10, 2007 (hereinafter, the "Guideline") The Guideline states that, in considering obviousness of an invention, even for a combination of known elements, the "operative question is thus 'whether the improvement is more than the predictable use of prior art elements according to their established functions (See "Guideline" at page 57527, col. I, quoting *KSR*, 550 US at 82 USPQ2CI at 1391.)

The '893 patent did not contemplate using any less than a concentration of 47  $\mu\text{mol/kg}$  (as explained in the calculation above) and has no disclosure that any lesser concentration may be used.

As detailed herein, even assuming the subject invention has, in part, the elements of the prior art, the subject invention is "more than the predictable use of prior art elements according to their established functions." Specifically, the claimed invention results a method having the unexpected and advantageous result that it may be carried out with far less alcohol concentration than that described in the prior art.

The cited '893 reference fails to teach, suggest, or even contemplate, the unexpected and



advantageous simplified composition including the advantageous capability to be work effectively with much reduced alcohol concentration.

Thus, a determination of non-obviousness is believed to be required in answer to the "operative question" identified in the PTO's own Guideline.

The deficiency of the '893 patent is not cured by combination with the disclosure of the '962 publication. The cited '962 publication does not provide any teaching or suggestion for the claimed method with an alcohol concentration of 0.1 to less than 10  $\mu\text{mol/kg}$ . The Office Action only cites the '962 publication as allegedly teaching a method for regulating pH.

Applicant further asserts the long-standing principle that the chemical arts are highly unpredictable and require a higher standard for obviousness determinations.

Although there is a vast amount of knowledge about general relationships in the chemical arts, chemistry is still largely empirical, and there is often great difficulty in predicting precisely how a given compound will behave. In re Dillon 919 F.2d 688, 710 (Fed Cir.,1990).

In the subject application, Applicant asserts there is analogous uncertainty as set forth by In re Dillon because there is great difficulty in predicting precisely how a system with a greatly reduced amount of alcohol will behave.

Additionally, claim 10 has been rejected over the aforementioned '893 patent and '962 publication in view of U.S. Patent 4,559,109 (hereinafter, the '109 patent). Applicant

respectfully asserts claim 10 is dependent on independent claim 1. Claim 1 has been shown (above) to be a non-obvious over the cited '893 patent and '962 publication. Combination of disclosures of the cited references with that of the disclosure in the '109 still are deficient to teach the method of claim 1 because claim 1 requires "metering in additional alcohol based on the measuring in order to maintain an alcohol concentration of from 0.1 to less than 10  $\mu\text{mol/kg}$  in the downcomer." There is no teaching or suggestion found anywhere in the combined disclosure of the '893 patent, '962 publication and '109 patent to teach or suggest the subject invention as now claimed.

In view of the failure of the '893 patent to teach, suggest, or provide any type of motivation to modify, and the failure of either of the '962 publication or the '109 patent to cure the deficiency in the '893 disclosure, Applicant asserts a rejection under 35 USC 103(a) cannot be properly applied. Applicant respectfully requests reconsideration withdrawal of this rejection.

No new matter is added by these amendments.

Applicant believes the subject application, as now presented is in condition for allowance. In the event the Examiner should still find any of the claims to be unpatentable, counsel would appreciate receiving a telephone call so that, if possible, patentable language can be worked out.

If an extension of time is required, petition for extension is herewith made. Any extension fee associated therewith should be charged to Deposit Account Number 12-1099 of Lerner Greenberg Sterner LLP.

Application No. 10/715,069  
Amdt. dated 3/11/08  
Reply to Office action of 12/12/2007

Please charge any other fees that might be due with respect to Sections 1.16 and 1.17 to  
Deposit Account Number 12-1099 of Lerner Greenberg Sterner LLP.

Respectfully submitted,

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1/2

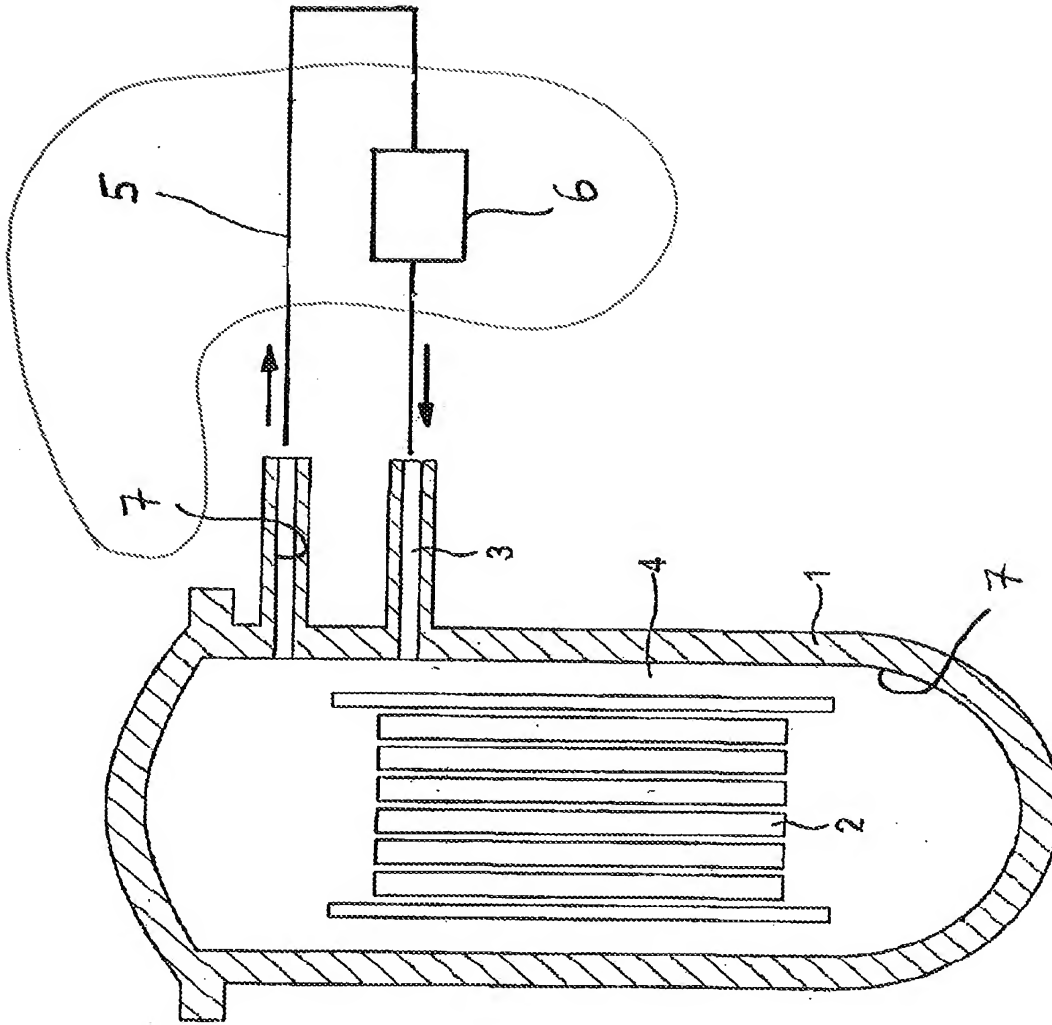


Fig. 1